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Review

Biodiversity and Ethnobotany of Crop Weeds in Sambhajinagar District (Maharashtra): A Review

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Abstract:
Weeds occurring within crop fields are conventionally viewed as competitors that reduce yield, yet a growing body of ecological and ethnobotanical literature indicates that many weed species contribute positively to agroecosystem functioning and rural livelihoods. This review synthesises published evidence on the biodiversity and ethnobotanical significance of crop-field weeds in Sambhajinagar (Aurangabad) district and the wider Marathwada region of Maharashtra, India. It examines regional patterns of weed diversity linked to semi-arid climate, soil type, irrigation regime, tillage and cropping practice; the ecosystem services weeds provide, including pollinator support, soil stabilisation and natural pest regulation; their documented uses as food, fodder, medicine and materials for cultural and ritual practice among rural and tribal communities; and the agronomic, ecological and public-health problems posed by invasive and difficult-to-control species such as Parthenium hysterophorus and Cyperus rotundus. Standard ecological methods (quadrat and line-transect sampling, Shannon–Wiener and Simpson diversity indices) and ethnobotanical tools (Use Value, Relative Frequency of Citation, Informant Consensus Factor) used in comparable studies are also reviewed. The synthesis shows that existing floristic and ethnobotanical work on Sambhajinagar district is fragmented, largely single-season, and rarely integrates ecological and ethnobotanical dimensions within one study. The review concludes that an integrated, district-specific investigation combining systematic floristic surveys with structured ethnobotanical documentation is needed to generate an up-to-date baseline for weed biodiversity and associated traditional knowledge, supporting conservation planning and culturally informed, sustainable weed management in the region.

Keywords: Crop weeds; Biodiversity; Ethnobotany; Agroecosystem services; Marathwada; Sambhajinagar.

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1. Introduction

Weeds are conventionally defined as plants growing where they are not desired, and they form a critical yet undervalued component of agricultural biodiversity. Although farmers commonly perceive weeds as aggressive competitors for nutrients, water, sunlight and space, ecological literature increasingly highlights the multifunctional role that many weed species play within agroecosystems (Holm et al., 1997). This negative perception of weeds emerged historically

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from conventional agricultural intensification, in which monocultures dominated and any non-crop species growing in the field was viewed as a threat to yield stability (Harlan & de Wet, 1965). However, modern ecological and ethnobotanical research has revealed that several weed species contribute positively to the structural and functional diversity of farmlands, supporting soil health, pollination and pest regulation while simultaneously serving as sources of food, fodder and medicine for rural communities (Rao, 2000; Marshall et al., 2003).

Weeds provide a range of ecosystem services that are frequently overlooked in conventional agronomy. Many species act as important sources of nectar and pollen for pollinators, particularly during periods when major crops are not in flower (Rao, 2000). Their continuous flowering cycles create stable foraging habitats for bees, butterflies and the natural enemies of crop pests, thereby helping to maintain ecological balance and enhance overall crop productivity. Diverse weed flora also improves soil health by reducing erosion, adding organic matter through leaf-litter deposition and facilitating nutrient cycling (Marshall et al., 2003). During fallow periods, some weed species function as temporary ground cover, helping to conserve soil moisture and prevent compaction.

From an ethnobotanical perspective, crop-field weeds have long been harvested and used by rural and tribal communities for food, fodder, medicine, fibre and cultural purposes (Rana & Ranade, 2009; Bharucha & Pretty, 2010). Species such as Amaranthus viridis, Chenopodium album, Launaea nudicaulis and Boerhavia diffusa are widely recognised for their nutritional and medicinal value, and communities in regions such as Maharashtra regularly incorporate them into herbal remedies, livestock treatment and household diets (Katewa & Galav, 2005). Such uses illustrate the close relationship between weed biodiversity and indigenous knowledge systems, a relationship who's cultural and livelihood significance is rarely acknowledged in mainstream agronomic research.

Contemporary agroecological thinking therefore argues against the complete eradication of weeds through herbicides or mechanical operations, favouring instead a selective and ecologically informed approach to weed management in which non-competitive, beneficial species are retained while aggressive, yield-reducing weeds are suppressed (Petit et al., 2011). Research on functional biodiversity suggests that maintaining a moderate level of weed diversity can improve pest suppression, strengthen pollination networks, buffer microclimates and increase the overall resilience of the agroecosystem (Altieri & Nicholls, 2004). The dynamic interactions among weeds, arthropods, soil microbes and crop plants reflect a balance that underpins the long-term sustainability of farming systems (Gaba et al., 2014).

2. Regional Context: Weed Diversity in Maharashtra and Marathwada

The Marathwada region, which includes Sambhajinagar (Aurangabad), supports a diverse assemblage of crop weeds owing to its semi-arid climate, variable rainfall, heterogeneous soils and the wide range of cropping systems practised throughout the year (Kshirsagar & Patil, 2019). Erratic monsoons, prolonged dry spells and marked temperature fluctuations create ecological niches that favour the establishment and persistence of a broad spectrum of weed species. Common cropping patterns—including cotton–soybean rotation, intercropping of sorghum and pulses, and seasonal cultivation of wheat and chickpea—offer repeated opportunities for both annual and perennial weeds to germinate, proliferate and adapt under contrasting field conditions (Deshmukh & Muley, 2016).

Studies conducted in Aurangabad and neighbouring districts report high species richness among weed families such as Asteraceae, Amaranthaceae, Poaceae, Cyperaceae and Euphorbiaceae, which together form the backbone of local weed flora (Gambhire, 2015). Asteraceae species such as Tridax procumbens, Parthenium hysterophorus and Eclipta prostrata are particularly abundant because of their prolific seed production and adaptability to disturbed soils, while Amaranthaceae weeds such as Amaranthus viridis and Achyranthes aspera thrive in nutrient-rich soils. Poaceae and Cyperaceae species tend to dominate irrigated or moisture-retentive fields during the kharif season (Gaikwad & Garad, 2017).

Comparative floristic surveys across Marathwada reveal a striking consistency in weed communities despite differences in microclimate and crop choice.

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Gaikwad and Garad (2017) reported patterns in Ahmednagar district that closely resemble those of Aurangabad, suggesting that regional biogeography and comparable agricultural management strongly shape weed distribution; parallel findings from Parbhani district (Shinde & Patil, 2018) reinforce this trend. Such uniformity across district boundaries is also attributed to seed dispersal through farm equipment, livestock movement, irrigation channels and wind (Ramaswamy & Singh, 2014).

Seasonality strongly influences weed composition and dominance. The monsoon-driven kharif season favours fast-growing annual weeds such as Cynodon dactylon, Digera muricata, Boerhavia diffusa and Euphorbia hirta (Yadav & Thorat, 2020), while the cooler, drier rabi season favours winter-adapted species such as Chenopodium album, Anagallis arvensis and Phalaris minor that exploit residual soil moisture left after monsoon cultivation (Wagh & Waghmare, 2016). These successional patterns are closely linked to crop phenology, soil moisture dynamics and tillage frequency, producing a broadly predictable seasonal cycle in the region's weed flora (Gaikwad & Patil, 2018).

3. Patterns of Weed Biodiversity and Ecological Drivers

Indian agricultural landscapes display strong ecological, edaphic and management-related gradients that determine weed diversity and distribution. Soil type—ranging from the black cotton soils (Vertisols) of the Deccan plateau to red loamy soils, laterites and alluvium—significantly affects the germination, growth and competitive ability of weeds adapted to particular pH ranges, moisture levels and nutrient regimes (Rao, 2000). Irrigation availability further modifies these patterns: irrigated fields favour moisture-loving species such as Cyperus difformis, Echinochloa colona and Ludwigia spp., whereas rain-fed systems are typically dominated by drought-tolerant weeds such as Digera muricata, Chloris barbata and Tridax procumbens (Ramaswamy & Singh, 2014).

Agronomic practices—tillage intensity, fertiliser application, herbicide regime and crop rotation—also shape weed assemblages. Intensive, repeated tillage disturbs soil structure and favours fast-cycling annual ruderal weeds such as Amaranthus viridis, Portulaca oleracea and Euphorbia hirta, which readily colonise freshly exposed surfaces (Gupta & Madaan, 2014). Reduced or zero-tillage systems, by contrast, limit soil disturbance and allow deep-rooted perennials such as Cynodon dactylon, Cyperus rotundus and Sorghum halepense to persist and spread through rhizomes, stolons or tubers (Jat et al., 2017). Nitrogen-rich fertiliser inputs tend to favour nitrophilous weeds such as Alternanthera sessilis, Ageratum conyzoides and Parthenium hysterophorus (Kumar & Singh, 2018), while sustained herbicide use can inadvertently select for herbicide-tolerant or resistant species, particularly in the cotton and soybean belts of Maharashtra (Padmapriya et al., 2019).

Landscape heterogeneity adds a further layer of complexity. Field margins, bunds, irrigation canals, uncultivated plots, grazing lands and fallow areas frequently support higher species richness than regularly cultivated fields, acting as ecological refuges for native, rare and medicinally important weeds that might otherwise be eliminated by intensive field management (Singh et al., 2012). These non-crop habitats also serve as reservoirs for pollinators and predatory insects, enhancing functional biodiversity at the landscape scale (Bàrberi et al., 2010). Crop rotation involving cereals, legumes and oilseeds creates seasonal variability in canopy structure, soil moisture and nutrient uptake that supports different weed guilds at different times of year, whereas monocropping tends to favour a narrow range of specialist weeds adapted to a single crop niche (Chhokar & Sharma, 2008).

4. Ethnobotanical Significance of Crop Weeds

Ethnobotanical studies across Maharashtra consistently show that many weed species carry substantial medicinal, nutritional, cultural and socio-economic value despite being classified as "undesirable" in conventional agronomy. In the Sambhajinagar (Aurangabad) district, common weeds such as Tridax procumbens, Eclipta alba, Argemone mexicana, Solanum nigrum, Achyranthes aspera and Boerhavia diffusa occupy an important place in traditional herbal medicine, particularly among rural, tribal and pastoral communities (Gambhire, 2015). These species are used to treat wounds, jaundice, fever, urinary disorders, digestive problems, skin infections and inflammatory conditions. Tridax procumbens, for example, is widely applied for wound healing owing to its antimicrobial and anti-inflammatory action, while Eclipta alba ("Bhringraj") is used in Ayurveda for liver ailments and hair and skin care, and Boerhavia diffusa ("Punarnava") is valued for its diuretic and hepatoprotective properties in treating oedema, jaundice and kidney disorders (Katewa & Galav, 2005).

Comparable medicinal uses have been documented across other agro-ecological regions of India, including Rajasthan, Madhya Pradesh, Odisha and the Western Ghats, where communities prepare decoctions, pastes, powders and infusions from weedy species to treat cough, cold, diarrhoea, hypertension and reproductive complaints (Rana & Ranade, 2009). This body of evidence indicates that weed flora forms an underexplored medicinal reservoir within primary healthcare systems, particularly among rural households with limited access to modern medicine (Kumar & Yadav, 2012).

Weeds also make a substantial contribution to household nutrition. Species such as Chenopodium album ("Bathua"), Portulaca oleracea ("Ghol" or purslane), Amaranthus viridis and Launaea nudicaulis are consumed as leafy vegetables, especially during lean seasons when cultivated vegetables are scarce (Prakash & Pal, 1992). These edible weeds are valued for their micronutrient content—iron, calcium, vitamin A, omega-3 fatty acids, antioxidants and essential amino acids—with Portulaca oleracea noted for containing among the highest levels of alpha-linolenic acid of any leafy vegetable, making it important for cardiovascular and immune health in rural diets (Stephen & Jeyaprakash, 2011).

Beyond food and medicine, weeds serve additional utilitarian functions in rural Maharashtra, including as fodder for cattle, goats and sheep during dry periods when cultivated fodder becomes scarce; species such as Cynodon dactylon, Digitaria sanguinalis, Aerva lanata and Dichanthium annulatum are commonly used in this way (Patil & Kshirsagar, 2010). Weeds are also incorporated into household applications such as natural dyes, cleaning agents and mosquito repellents, and into cultural and religious rituals—Achyranthes aspera in ceremonial practice, and Calotropis gigantea and Datura metel in local festivals and spiritual traditions (Katewa & Galav, 2005). Collectively, these uses show that crop weeds represent a rich repository of indigenous knowledge and livelihood support rather than a purely agricultural nuisance, underscoring the need to recognise their ethnobotanical significance in developing culturally sensitive weed management strategies.

5. Weeds as Ecosystem Service Providers

Weeds perform several ecological functions that contribute to the long-term sustainability of agricultural systems. Their flowers offer continuous sources of nectar and pollen to honeybees, solitary bees, butterflies, hoverflies and beetles, particularly during periods when major crops are not in bloom—an important service in semi-arid regions such as Maharashtra, where seasonal flowering gaps are common (Nichols et al., 2015). Species such as Ageratum conyzoides, Tridax procumbens, Parthenium hysterophorus and Euphorbia hirta have been shown to support diverse pollinator guilds during these lean months, sustaining pollination networks that benefit nearby crops (Sinu et al., 2012).

Weeds also contribute to soil stabilisation and erosion control: their dense root systems bind soil particles, reduce runoff and protect farmland from wind and water erosion, a function of particular importance on sloping terrain or degraded soils (Altieri, 1999). Species such as Cynodon dactylon, Vetiveria zizanioides and Desmodium triflorum are noted for strong soil-binding capacity, while decomposing weed litter enriches the humus layer and supports microbial activity, nitrogen fixation and phosphorus solubilisation (Singh & Raghubanshi, 2014).

Weeds interact with pest and natural-enemy communities in ways that can benefit crop protection. Some species, such as Bidens pilosa and Abutilon indicum, act as trap crops that draw sucking pests away from economically important vegetables (Gurr et al., 2003), while flowering weeds provide nectar and shelter for ladybird beetles, lacewings, spiders and parasitoid wasps that regulate pest populations throughout the season (Landis et al., 2000). Low-growing, non-competitive weeds can additionally buffer microclimatic conditions within fields, reducing soil temperature fluctuations and supporting a more diverse arthropod community, which enhances

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agroecosystem resilience under drought or irregular rainfall (Gaba et al., 2014). Taken together, these services support the case for selective, ecologically informed weed management rather than indiscriminate eradication (Altieri & Nicholls, 2004).

6. Invasive and Harmful Weeds in Maharashtra

Despite their ecological and ethnobotanical value, several weed species pose serious agronomic, ecological and public-health challenges. Parthenium hysterophorus is among the most notorious invasive weeds in India and Maharashtra, owing to its rapid colonisation, prolific seed production and tolerance of diverse environmental conditions (Kaur et al., 2014). It exhibits strong allelopathic activity, releasing compounds such as parthenin and hysterin that inhibit the germination and growth of surrounding crops, native herbs and even tree seedlings, thereby disrupting local plant communities and weakening ecosystem resilience (Batish et al., 2002). Dense Parthenium infestations can reduce crop productivity by an estimated 25–40 per cent in crops such as sorghum, maize and legumes (Lakshmi & Srinivas, 2007), while its invasion of rangelands reduces fodder availability and adversely affects livestock health.

Parthenium is equally significant as a public-health concern, being a major cause of airborne allergic reactions, contact dermatitis, asthma, bronchitis and eye irritation among farmers and residents of infested areas, with allergenic pollen capable of travelling long distances during peak flowering (Kaur et al., 2014). Notably, phytochemical and ethnomedicinal studies also report antimicrobial, analgesic and anti-inflammatory properties in Parthenium extracts, pointing to a complex dual role in which a species can be simultaneously harmful and potentially useful depending on context and management (Sharma et al., 2019).

Other troublesome weeds common in Marathwada include Cyperus rotundus, Sorghum halepense and Alternanthera philoxeroides (Patil & Ubale, 2017). Cyperus rotundus, regarded as one of the world's most difficult-to-control perennial weeds, spreads through an extensive network of tubers and rhizomes that make it highly resistant to chemical and mechanical control (Rao, 2000). Sorghum halepense (Johnson grass) forms dense stands that outcompete crops and hinder mechanised farming, while Alternanthera philoxeroides (alligator weed), an invasive aquatic and semi-aquatic species, disrupts irrigation channels, reduces water flow and invades moist crop fields.

7. Methodological Approaches in Weed Diversity and Ethnobotany Studies

Standardised methodologies underpin ecological research on agroecosystem weed biodiversity. Quadrat sampling remains the most widely used technique for estimating species richness, abundance and density because it allows consistent comparison across habitats and seasons (Misra, 1968), while line-transect methods are particularly effective in heterogeneous fields such as those found in Sambhajinagar, where weed distribution is shaped by crop rotation, irrigation pattern and soil variability (Kent, 2012). Stratified seasonal surveys covering the pre-monsoon, monsoon and post-monsoon periods are essential, as weed phenology and abundance shift markedly with rainfall and temperature (Kohli et al., 2006), and permanent plots further support long-term monitoring of successional change (Elzinga et al., 2001).

Weed diversity is typically quantified using established floristic indices. The Shannon–Wiener diversity index and Simpson's index are the most frequently applied metrics for characterising community structure, evenness, dominance and stability (Magurran, 2004), while density, frequency, abundance and the Importance Value Index (IVI) help assess the ecological significance of individual species within a cropping system (Curtis & McIntosh, 1951).

Ethnobotanical research integrates ecological knowledge with indigenous cultural practice through methods such as semi-structured interviews, free listing, participant observation and guided field walks, which allow systematic documentation of traditional uses of crop weeds for medicine, food, fodder, ritual and household application (Martin, 1995; Alexiades, 1996), while ensuring that local knowledge systems are accurately represented and culturally contextualised (Bernard, 2011). Quantitative indices strengthen the reliability of such data: Use Value (UV) reflects the relative importance of a species based on informant reports (Phillips & Gentry, 1993), Relative Frequency of Citation (RFC) measures how widely a plant is cited across participants (Tardío & Pardo-de-Santayana, 2008), and the Informant Consensus Factor (ICF) identifies agreement among informants

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regarding particular ailment categories, highlighting culturally preferred and therapeutically important species (Heinrich et al., 1998).

8. Knowledge Gaps and the Need for a District-Specific Study

Although weed flora has been examined in several parts of Maharashtra, comprehensive district-level research that simultaneously integrates biodiversity assessment with ethnobotanical documentation remains largely absent for Sambhajinagar. Existing studies tend to focus on individual crop systems—such as sugarcane, soybean, cotton or paddy—or are limited to single-season surveys, producing only a fragmented picture of overall weed diversity (Gaikwad & Garad, 2017; Shinde & Patil, 2018). Many floristic surveys also overlook the socio-cultural dimension of weeds, despite widespread use of weed species for medicinal, nutritional, veterinary and ritual purposes among rural communities (Salunkhe & Kadam, 2015), a gap that is particularly evident in Sambhajinagar, where traditional knowledge remains strong but is rarely documented systematically.

Rapid changes in climatic patterns over the past decade—irregular monsoon onset, prolonged dry spells and shifting rainfall intensity—have significantly influenced weed emergence and community structure (Yadav & Thorat, 2020; Patil et al., 2021), while increasing dependence on chemical fertilisers, herbicides, mechanisation and high-yielding crop varieties has altered weed composition and favoured certain invasive or resistant species (Kumar & Singh, 2019). These transformations suggest that weed flora documented in earlier decades may no longer accurately represent current field conditions in Sambhajinagar.

From an ethnobotanical standpoint, weeds once commonly used as vegetables, fodder or traditional medicine—such as Amaranthus viridis, Boerhavia diffusa and Eclipta prostrata—may be declining in availability or cultural relevance because of land-use change and the weakening transmission of traditional knowledge across generations (Pawar & Wagh, 2016). Without updated ethnobotanical surveys, valuable information on the cultural and practical uses of local weed flora risks being permanently lost.

These gaps justify a combined ecological and ethnobotanical study of Sambhajinagar district. By documenting species diversity through standard ecological indices while simultaneously gathering indigenous knowledge from local farmers, herbal healers and rural households, such research would generate a holistic, baseline understanding of the district's crop weeds—supporting long-term monitoring, conservation planning and the development of sustainable, culturally informed weed management strategies that bridge scientific weed ecology with traditional plant-use knowledge.

9. Conclusion

The literature reviewed in this paper establishes that crop-field weeds are not merely agricultural liabilities but multifunctional components of agroecosystems that provide pollination support, soil stabilisation, natural pest regulation and microclimatic buffering, while simultaneously serving as sources of food, fodder, medicine and cultural practice for rural communities in Maharashtra and the wider Marathwada region. At the same time, invasive species such as Parthenium hysterophorus and difficult-to-control perennials such as Cyperus rotundus illustrate that weed communities also carry genuine agronomic and public-health costs that require careful management. Existing floristic and ethnobotanical studies in and around Sambhajinagar district remain fragmented, single-season, or narrowly focused on either ecology or traditional use in isolation.

This underscores the need for an integrated, district-specific investigation combining systematic floristic surveys with structured ethnobotanical documentation, using established diversity indices (Shannon, Simpson) and ethnobotanical metrics (UV, RFC, ICF) to generate a comprehensive, up-to-date baseline for weed biodiversity and associated traditional knowledge in the district. Such a study would not only fill an important regional knowledge gap but would also provide the scientific and cultural evidence base needed to design selective, ecologically sound and socially acceptable weed management strategies for Sambhajinagar and comparable semi-arid agricultural landscapes.

References

1. Alexiades, M.N. (1996). Selected Guidelines for Ethnobotanical Research: A Field Manual. New York Botanical Garden.

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Website: https://mrajournal.in/
ISSN: 3139-5473
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2. Altieri, M.A. (1999). The ecological role of biodiversity in agroecosystems. Agriculture, Ecosystems & Environment, 74(1–3), 19–31.
3. Altieri, M.A. & Nicholls, C.I. (2004). Biodiversity and Pest Management in Agroecosystems. Food Products Press.
4. Bàrberi, P., Burgio, G., Dinelli, G., Moonen, A.C., Otto, S., Vazzana, C., & Zanin, G. (2010). Functional biodiversity in the agricultural landscape: relationships between weeds and arthropod fauna. Weed Research, 50(5), 388–401.
5. Batish, D.R., Singh, H.P., Kohli, R.K., & Kaur, S. (2002). Phytotoxicity of Parthenium hysterophorus residues. Crop Protection, 21(4), 347–350.
6. Bernard, H.R. (2011). Research Methods in Anthropology: Qualitative and Quantitative Approaches. AltaMira Press.
7. Bharucha, Z. & Pretty, J. (2010). The roles and values of wild foods in agricultural systems. Philosophical Transactions of the Royal Society B, 365(1554), 2913–2926.
8. Chhokar, R.S. & Sharma, R.K. (2008). Multiple herbicide resistance in littleseed canarygrass (Phalaris minor): a threat to wheat production in India. Weed Biology and Management, 8(2), 112–123.
9. Curtis, J.T. & McIntosh, R.P. (1951). An upland forest continuum in the prairie–forest border region of Wisconsin. Ecology, 32(3), 476–496.
10. Deshmukh, R.S. (2020). Ethnobotanical studies of some weeds of Marathwada. Bulletin of Environment, Pharmacology and Life Sciences (BEPLS).
11. Deshmukh, S. & Muley, A. (2016). Cropping pattern and weed dynamics in Marathwada region. Journal of Agricultural Research.
12. Dhale, J.A. & Bodake, S.S. (2009). Ethnomedicinal studies of weeds in crop fields of Marathwada. Ethnobotanical Leaflets.
13. Dhole, J.A., Dhole, N.A., & Bodke, S.S. (2009). Traditional uses of selected weeds in Marathwada region.
14. Dhorde, A. & Liu, S. (2018). Agro-ecological zonation and crop–pest interactions in semi-arid Maharashtra. Journal of Environmental Biology.
15. Elzinga, C.L., Salzer, D.W., & Willoughby, J.W. (2001). Measuring and Monitoring Plant Populations. U.S. Bureau of Land Management.
16. Gaba, S., Fried, G., Kazakou, E., Chauvel, B., & Navas, M.L. (2014). Agroecological weed control using a functional approach. Agronomy for Sustainable Development, 34(1), 103–119.
17. Gaikwad, S. & Garad, K. (2017). Floristic diversity of weeds in agricultural fields of Ahmednagar district, Maharashtra. International Journal of Life Sciences.
18. Gaikwad, S. & Patil, R. (2018). Seasonal succession of weed communities in semi-arid Maharashtra. Indian Journal of Weed Science.
19. Gambhire, V.S. (2014). Medicinal importance of some weeds of Aurangabad District (Maharashtra).
20. Gambhire, V.S. (2015). Ethnobotanical survey of weed flora in Aurangabad district, Maharashtra. Journal of Medicinal Plants Studies.
21. Gupta, O.P. & Madaan, T.R. (2014). Effect of tillage practices on weed dynamics in field crops. Indian Journal of Weed Science.
22. Gurr, G.M., Wratten, S.D., & Altieri, M.A. (2003). Habitat Management in Agroecosystems for Pest Suppression. CSIRO Publishing.
23. Harlan, J.R. & de Wet, J.M.J. (1965). Some thoughts about weeds. Economic Botany, 19(1), 16–24.
24. Heinrich, M., Ankli, A., Frei, B., Weimann, C., & Sticher, O. (1998). Medicinal plants in Mexico: healers' consensus and cultural importance. Social Science & Medicine, 47(11), 1859–1871.
25. Holm, L., Doll, J., Holm, E., Pancho, J., & Herberger, J. (1997). World Weeds: Natural Histories and Distribution. Wiley.

Multidisciplinary Research Archives (MRA)
Website: https://mrajournal.in/
ISSN: 3139-5473
Vol. 1, Issue 2, July-Dec, 2026
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26. Jadhav, R., Kulkarni, S., & Pawar, V. (2020). Irrigated and rain-fed farming systems and pest population dynamics in Marathwada. Journal of Entomology and Zoology Studies.
27. Jat, R.K., Sapkota, T.B., Singh, R.G., Jat, M.L., Kumar, M., & Gupta, R.K. (2017). Seven years of conservation agriculture in a rice–wheat rotation of Eastern Gangetic Plains of South Asia: Yield trends and economic profitability. Field Crops Research, 164, 199–210.

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